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Toward a Functional Analysis of Delusional Speech and Hallucinatory Behavior

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An approach to a functional analysis of delusional speech and hallucinatory behavior is described and discussed using concepts found in Goldiamond's (1975a and 1984) nonlinear contingency analysis and Skinner's *Verbal Behavior* (1957). This synthesis draws upon and concords with research from the animal laboratory, with the extensive experimental literatures on stimulus control and signal detection theory, and with our own clinical experiences.

In this formulation, delusional speech and hallucinatory behavior are viewed as successful operants. Accordingly, we argue that such behaviors can be considered adaptive and rational, rather than maladaptive and irrational, when analyzed within a model of consequential governance that includes alternative sets of contingencies. Several clinical examples are offered to illustrate both analytic procedures and the design of systemic treatment programs based upon a behavioral contingency analysis derived from a natural science of behavior. Throughout, we emphasize the consequential governance of these clinically important classes of behavior, in contrast to other approaches which suggest formal similarities to operant verbal behavior but largely ignore the role of consequential contingencies.

In clinical problems involving "sensory" or "cognitive" processes, it is often a temptation to refer to control by "private events" or to define behavior in the absense of observable discriminative stimuli as hypothetical tacts of such private events. "I am hearing voices" is commonly followed by "What are they saying?" Accordingly, the clinician then attempts to find out why these voices are heard. For example, in cases of auditory hallucinations, the ambient environment may be thought to produce an effect similar to Skinner's "verbal summator" (Skinner, 1936), or patients may be considered to be talking to themselves covertly, i.e., below audible levels (see, for examples, Gould, 1950; McGuigan, 1966). Similar speculation can be offered concerning other distorted perceptual responses. Alternatively, biochemical or other organic disorders may be postulated in various reductionist explanatory schemata. Perhaps the patient (organism) is somehow *defective* in filtering irrelevant information the "normal" population filters automatically (e.g., Freedman, 1974) or may be experiencing covert sensory "noise" as a result of some organic disturbance—in any case, the patient indeed "sees" the world differently and is merely reporting his/her observations. (For an incisive review of various theoretical stands on these issues, see Salzinger, 1973.)

Another approach is to treat hallucinatory or delusional behaviors simply as topographies to be eliminated. Accordingly, they may be treated by means of extinction (by witholding attention), punishment procedures (e.g., token fines, times out), reinforcement of "competing" or "incompatible" repertoires, desensitization, or such "cognitive" procedures as "thought stopping" or "self-instruction." A variety of these procedures can be applied topically in attempts to eliminate the disturbing patterns of behavior (for a recent review, see Burns, Heiby, & Tharp, 1983). Typically in these approaches, the behavior to be decreased is first identified and counted; then the

[1] Earlier versions of this paper were presented at the Second Annual Convention of the Midwestern Association of Behavior Analysis, Chicago, May 1976, and at the New Mexico Conference on Behavior Therapy, Ghost Ranch, NM, September 1979. The authors thank A. Michael Wylie for presenting the paper at the Ghost Ranch conference, and for his comments on early manuscripts. Reprints may be obtained from either author at the following address: Behavior Analysis Research Laboratory, Department of Psychiatry, Box 411, The University of Chicago, 5801 South Maryland, Chicago, IL 60637. We fondly dedicate this paper to Izzy Goldiamond, whose friendship and writings have pervaded our work almost from the outset.

procedure is applied. No attempt is made to analyze the behavior as an operant maintained by its consequences, and the treatment is usually directed at the form of the problem behavior itself.

This paper presents an initial framework for the functional, as well as topographic, nonlinear analysis of hallucinatory and delusional patterns of behavior and suggests systemic, as well as topical, procedures that may be brought to bear on the analysis of such disturbing patterns of behavior.[2] The approach offered here is synthesized from Goldiamond's (1984) most recent analysis of alternative contingencies, Skinner's (1957) analysis of verbal behavior, selected basic research, and our own work in both the laboratory and the clinic. As the first in a series, this paper introduces an operant contingency analysis of established patterns of hallucinatory and delusional behavior from the perspective of a natural science of behavior.[3]

THE FUNCTIONAL MODEL: DISTURBING PATTERNS OF RATIONAL BEHAVIOR

We begin with the assumption that the behavior under consideration is *operant,* i.e., it is governed by its consequences under certain constraining conditions. As operant behavior, its frequency or rate may be assumed to be a function of its contingent consequences. To the extent that hallucinatory and delusional patterns are characteristically maintained by changes in the behavior of some referent verbal community, we submit that these patterns may be further classified as verbal behavior, much the same as other more familiar verbal patterns.

What makes these patterns of behavior appear as "abnormal," "disturbed," "maladaptive," "dysfunctional," "paradoxical," and so on (ad nauseum), are not their specific structural attributes. As with other verbal behaviors, functional relations can be observed between various so-called psychotic patterns and the ambient social environment (again, see Salzinger, 1973). Verbal contingency requirements may indeed produce "pathological" forms of verbal behavior (Braginsky, Grosse, & Ring, 1966), but the structures of these patterns appear to conform to the implicit "demand characteristics" of the given verbal community (see, for example, Braginsky, Braginsky, & Ring, 1969). Nonetheless, such behavior is usually classified as requiring clinical intervention because of its obvious costs to the individual, generally without similar reference to possible reinforcing outcomes the behavior may have (Goldiamond, 1974, 1979).

While it is true that hallucinatory and delusional patterns may entail enormous cost to the individual (e.g., lost employment, incarceration, social stigmatization, and preemption of many other social opportunities), we maintain that their frequency is governed by positive reinforcement contingencies (for an interestingly parallel formulation, but from a different theoretical standpoint, see Adler, 1931). The potency of these contingencies is attested by frequent occurrence of the behavior *despite* such costs.[4]

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[2] For discussions of the distinctions between topographic and functional description, see Skinner (1953), between topical and systemic treatment, see Goldiamond (1979, 1984), between pathological and constructional formulations, see Goldiamond (1974), and between linear and nonlinear analysis, see Goldiamond (1975a, 1976, 1984).

[3] Subsequent papers will examine some possible origins of these kinds of behavior patterns, their relation to organic variables, the effects of psychotropic drugs, and the implications of these for programs directed at changing such patterns.

[4] Consider a young man who, on a regular basis over a period of years, picks fights with the meanest and strongest people he can find. Each fight lasts until either one of the two is knocked unconscious, or somebody else stops the fight. This particular behavior pattern appears quite disturbing and bizarre. Its costs are obvious, in the multiple injuries both given and received, the price of medical attention, and so on. In addition, society often imposes either psychological treatment or criminal penalties on people who behave this way chronically. However, the behavior appears less bizarre, indeed eminently sensible, when we are told the young man's name is Leonard, Holmes, Cooney, Rossman, or Ali, and learn that the prize money

The proposed kind of cost/benefit contingency analysis extends not only to those patterns which, on their face, are considered rational (i.e., whose benefits are readily apparent) but also to disturbing patterns whose costs are so dramatic and immediate that they might completely obscure the clinician's view of any possible benefits. When the benefits of the disturbing pattern are so overlooked, the search for available alternatives is effectively precluded; moreover, a program to establish patterns which produce the same benefits but at less personal or social cost is never undertaken.

Taking the "Ir" Out of Irrational Behavior

Clinicians working with clients who exhibit hallucinatory or delusional patterns of behavior so label these patterns by virtue of their frequent occurrence under conditions in which there appear to be no rational outcomes (i.e., no maintaining consequences). These patterns are further considered pathological in that they appear to occur with high frequency, despite resulting reinforcement cost or outright punitive consequences. Such disturbing patterns may also preempt other patterns that, under the same circumstances, could result in positive outcomes. (The frequent occurrence of such occasion·behavior → consequence relations, both across populations and within individual repertoires, is an apparent contradiction of prevailing operant theory.) However, Goldiamond (1975a, 1975b) has shown that if the alternatives to the behavior under investigation are examined explicitly, the disturbing behavior may indeed be considered sensible. Further, an analysis of these sets of alternatives may resolve patterns not predicted by the predominant linear framework currently and historically employed in the operant laboratory and commonly extended to applied programs.

Laboratory investigators using signal detection theory (Green & Swets, 1973) have observed that tacts by psychophysical observers occur not only in accord with the presence or absence of the appropriate stimuli, but also in accord with the *matrix* of consequences, the instructions, and contingency-related potentiating variables.[5] The "noise" component of the environment is assumed in signal detection theory to come from three possible sources. First among these is noise explicitly presented by the investigator. Second is the random noise in the environment itself, including that inherent

for a single such fight may exceed the average behavior analyst's total life's earnings! The remuneration and prestige conferred on the successful prizefighter do not make the wounds received nor the incurred medical expenses any less onerous. What this pattern does tell us is how potent such consequences as money and status can be, how much individuals will tolerate to obtain them, and how, in certain instances, costly behavior can appear quite reasonable when we examine all of its consequences (i.e., punitive *and* reinforcing ones). Our prizefighter exemplifies one more important point, that is, the role of available alternative opportunities for obtaining the same reinforcing consequences. One wonders whether Leonard, Holmes, etc., would ever have entered the ring if they could have earned the same money and status as readily in some other manner which did not involve the same costs. The historical role of various immigrant and minority groups in prizefighting suggests that they probably would not have. In summary, then, we strongly agree with Goldiamond's (1974, 1976, 1979, 1984) repeated admonition that we must not only examine the costs and benefits of the disturbing pattern of behavior, but also the costs and benefits of its available alternatives as well.

[5] The procedures employed in this area provide a more detailed and perspicuous account of the variables involved in responding to ambiguous environmental events than did Skinner's initial work with the verbal summator. In this schema, consequences are explicitly entered into a matrix, whose rows and columns comprise a minimum of two alternative states of the environment and two alternative response classes, respectively. For example, the observer may be instructed to examine a stimulus presentation containing either a tone plus white noise or white noise alone, and to say "Tone" if the tone plus white noise is present, or to say "Noise" if white noise alone is present. The derivation of independent sensitivity and bias measures (d' and β, respectively) in signal detection theory is an attempt to separate the discriminability of a signal, superimposed on any or all sources of noise, from the "distortion" or "impurities" of the tact ("false alarms") produced by consequential and other procedures.

in the mechanical production of the experimental signal. Finally, a third source is considered to be inherent in the sensory apparatus of the organism being studied. Observer reports of "signal event present" in the absence of the signal have been formerly treated as "perceptual errors" by classical psychophysics and derivative psychological theories. These "errors" in particular are considered false alarms in signal detection theory and have been demonstrated to be rational and explicit outcomes of consequence manipulations, instructional variables, and so on (for reviews, see Goldiamond, 1962, 1964). Accordingly, we submit that hallucinatory and delusional patterns should be treated likewise. Nonetheless, when such distortions or "impurities" of the tact are observed in the clinic, they often are labeled as hallucinatory or delusional, and the search for a private referent begins.

Goldiamond (1975b) has made another point that is crucial to the understanding of hallucinatory and delusional patterns. He described a case in which a woman could not get out of bed because of a cockroach phobia and thereby obtained the rightfully deserved attention of her husband. Goldiamond noted that for the woman's phobic pattern to control her husband's behavior successfully, it had to occur at times when it did not directly result in such control. Stated otherwise, the pattern would remain effective only so long as it did not occur exclusively at the convenience of the woman—the "costs" legitimized the "symptom" and deferred punitive countercontrol.

This kind of case poses an interesting problem for the contingency analyst. For a behavior to be reinforced on certain occasions (S^D), it must also occur under circumstances which will not lead to reinforcement (S^Δ), and may even produce an aversive consequence. Its occurrence under what is traditionally termed S^Δ, as well as under S^D, serves as a conditional discriminative stimulus for the reinforcing verbal community. This is similar to laboratory arrangements in which the presence or absence of a background color governs a pigeon's pecking either a circle or a triangle (see, for example, Reynolds, 1963). The occurrence of a disturbing pattern of behavior under S^Δ may in effect establish the potency of contingencies wherein that behavior will be subsequently reinforced. In other words, the apparent absence of maintaining consequences or the presence of aversive consequences on some occasions, may be requirements that must be met for reinforcement to be available on other occasions (cf. Aesop, ca. 600 BC, "The little boy who cried wolf," as a converse case).[6]

As stated earlier, the primary clinical tactic in such cases should be to ascertain the functional relation of that behavior to its environment in a thoroughgoing *contingency analysis.* If we consider hallucinatory and delusional patterns to be operants emitted at relatively high rates, the following questions arise as a matter of course. Along with identifying the occasions for these patterns (which may, indeed, include private events), we should ask, "What are the consequences maintaining these occasion·behavior relations?" and "What are the *contingency matrix relations* that make one occasion·behavior relation more probable than another?" or, put more simply, "What are the advantages to the client in be-

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[6] Such relations are not entirely uncommon in normal activities. An analogous situation might occur in reading a detective story. It is always possible to read the last page and to find out who committed the murder at any time during reading. However, without having first read the preceding text, reading the last page probably would not be much of a reinforcer. Reading progressively through the text establishes the effectiveness of reading the last page as a reinforcer.

Perhaps a more telling example would be to cite the relation between paying one's electric bill and the *light-switch*(S^D)·*press*(R) → *lights-on*(S^r) contingency. The behavior of writing a check for the utility company involves obvious financial costs with no immediately observable benefits. However, unless the check is written and mailed, no electric light is available. Note that writing the check does not make the lights themselves reinforcing, but rather allows the lights to enter into the *light-switch*(S^D)·*press*(R) → *lights-on*(S^r) contingency. (It has not escaped our notice that programs which establish these kinds of relations may shed new light on self-control procedures, and suggest yet another area for laboratory investigation.)

having this way as opposed to some other way?"

Explicit identification of the prevailing contingency relations is essential in view of their powerful control in maintaining the high cost operant. The contingent consequences of the disturbing pattern are critical to the individual *despite* their high cost. Thus, rather than focusing on the elimination of the individual's behavior of choice for obtaining them, these consequences can be "harnessed and made contingent upon less costly behavior in a program that succeeds" (Goldiamond, 1970).

Hallucinatory and Delusional Behavior as Successful Operants

A psychiatric patient complained of how hard it was for her to go to the nurses' station and ask to talk to a staff person. When the unit staff observed that this patient's discussions with them were becoming less frequent, one staff person suggested that the patient was "withdrawing further into herself." One day, while sitting in the dayroom, the same patient began exclaiming that her head was falling off and acted convincingly frightened. A staff person then went and sat with her to "calm her down." The delusion became more pronounced, and the woman also reported hearing "popping noises" preceding feelings that her head was falling off. Later, one of the authors was asked to consult on this case. He discussed this delusion with the patient, and together they analyzed the pattern. It was noted that a not-too-hidden cost of approaching staff at the nursing station entailed a possible interruption of an ongoing conversation among them, sometimes incurring hostile responses. Her delusion was an immediately less onerous, but ultimately very costly, alternative to the more difficult task of going to the nurses' station to seek out unit staff. Both patterns, it was noted, appeared to produce the same maintaining consequences, i.e., conversations with staff. Viewed in terms of the consequential alternatives available to this person, her delusional behavior now made sense. A program was subsequently implemented to train the client to approach and engage others in prolonged conversations which would maintain their interest as well as hers. As predicted from the foregoing analysis, the program in fact resulted in her delusional speech being altogether replaced by "normal" conversation. The origins of such patterns will be discussed in greater detail in a subsequent paper of this series. However, it is worth noting here that when asked how this problem first arose, she responded that another patient had asked if her head ever fell off, and from that point on it did.

Where being in the hospital itself is the critical consequence, hallucinations and delusions are among some of the few sure admission tickets available, aside from suicidal gestures (Goldiamond, 1974). Where such behavior appears to be maintained without readily observable consequences, as in nondiscriminative avoidance, answers may be found by an examination of alternatives (Goldiamond, 1975a). Here, the question might be asked, "What would happen if the person didn't behave this way?"

In a different case, one of the authors was asked to "keep an eye" on a woman who was described as "acting strangely" while the other staff on the psychiatric unit held a meeting to discuss the patient's behavior. During the meeting, the woman sat on a couch in the dayroom, drawing stars on paper plates and tossing them into the air, one at a time. Walking over to interview her, the author asked if he could toss one too. She said, "Sure, I could use the help." After throwing a couple of plates, he asked her the reason for tossing the plates in the air. She replied that she was checking the levels of static electricity in the air. After some discussion about angles of trajectory and electricity, the interviewer then asked if the woman had a reason for monitoring the electricity. She replied that she was having a lot of trouble with it lately, experiencing power surges in her apartment which made the lights extremely bright. It got so bad, in fact, that she had to go outside and try to knock the excess elec-

tricity loose by hitting a nearby telephone pole with a brick. Her neighbors saw her doing this, and asked her what she was doing. When she began screaming about electricity being all around her, the police were called and she was promptly taken to the hospital emergency room.

The interviewer then asked if there were any times when she did not have problems with electricity. The woman replied, "No, never!" The question was quickly changed to whether there were times when the electricity was especially troublesome. The woman replied, "Yes," and said that it usually became worse under conditions of "emotional stress," when she most needed to be left alone to concentrate. The interviewer replied that the electricity seemed to be a big problem for her right now, and asked if some stressful event had, in fact, occurred recently. She said "Yes," and proceeded to describe how her boyfriend had left without warning, taking her money from a recently cashed S.S.I. check and leaving her unable to pay her rent. She said she sat down to try to figure out what to do, and that was when her lights started to become bright because of the power surges. Did she know what might happen to her as a result of trying to shake loose the excess electricity? She answered that she "figured" she would probably be taken to the hospital. To this hospital? She said, "Not exactly this one, but a hospital somewhere." The interviewer then told her what a fine social worker there was on this particular unit, and how they would certainly get her finances straightened out, and find her a place to live. The woman sat back on the couch, and looked relaxed for the first time since being admitted.

The interviewer asked whether the woman could say what she thought of this particular hospital's intake procedure, given her similar experiences with other hospitals in the past. She described it as better than most, but preferred a hospital in Minnesota. There, they kept the questions to a minimum, gave her hot chocolate, and were very helpful with getting her settled into her room. The conversation lasted another hour. At no time during this time was another plate thrown, nor electricity mentioned. The conversation, instead, centered around hospitals, a subject on which she was obviously well versed.

It was quite apparent that this woman had learned to use the mental health system to help solve her problems. Hallucinatory behavior and delusional speech were her admission tickets to the hospital. Without them, she would be left out on the street, alone to fend for herself, similar to the animal in the avoidance procedure who must press the lever or be left alone to face the otherwise unavoidable shocks. The mental health system, like the unscrambled shock-grid used in early avoidance research, provided the woman a momentary respite now denied the laboratory rat by scrambled grid-floors. However, when the rational outcomes of these patterns were implicitly acknowledged and the conversation concerned an area about which she had some expertise, her "hallucinations" and "delusions" were never mentioned.

Note that the woman described above had abruptly answered, "No," when asked whether there were times when the electricity was not a problem for her. This question addressed the possible absence of her symptom, and it almost ended the interview. Her emphatic reaction was surprising at first, but conversations since then with many other psychiatric in-patients have yielded similar results. As described by Skinner (1957), most questions are mands, and as such, even the "soft" ones, they specify their characteristic reinforcers. In the present case, the question concerned those times when electricity was *not* a problem. To the extent that terminating the conversation was aversive, or that she had a history of aversive consequences for refusing requests, the patient now found herself in quite a dilemma. She was faced with a request to which an affirmative answer, while reinforcing the interviewer's probing, might also be the beginning of a questioning of her "symptoms'" legitimacy. However, such questions can also be ignored or refused or a nonsensical answer

given, any of which responses might change the course the interviewer takes without ending the conversation.

Psychiatric metaphors used in connection with such patterns often involve terms like "defense," "denial," or "resistence." Accordingly, any questions that so endanger the patient's means of obtaining critical consequences are likely to be met with similarly evasive behavior. Changing the question so that the symptom, always present and so acknowledged, is considered merely worse or better at some times effectively reduces the aversiveness of the question. The initial interview, as with all constructional interviews, is a continual effort to make sense out of the patient's behavior. In this case, the woman's "No, never!" made eminent sense, as did the hallucinatory and delusional patterns which brought her to the hospital in the first place.

Hallucinations and Delusions as Contingency Tactors

At times, delusions and hallucinations are not merely admission tickets. They may be verbal responses which tact highly complex and often confusing contingencies. The terms 'metaphor' and 'metaphorical extension' might appear immediately appropriate when discussing these patterns. However, such patterns are metaphorical extensions under multiple sources of control. As Skinner (1957) notes:

> The metaphorical expressions of a given speaker or writer reflect the kinds of stimuli which most often control his behavior. This fact is commonly used in inferring conditions about the life of a writer either when such facts are not otherwise known or in order to establish authorship . . . . The argument may be restated as follows: when a situation simply evokes unextended tacts, the behavior tells us something about the situation but very little about the speaker, but metaphorical responses have been acquired *under other circumstances,* about which inferences may therefore be made. (p. 95)

Various deprivation, punishment, and reinforcement conditions may act together to produce such verbal operants. Skinner (1957) asserts that standard tacts can be distorted in particular ways by a variety of conditions, e.g., positive reinforcement may produce exaggeration, or the removal of aversive stimuli may come to govern excuses concerning the traffic when one is late. Tacts may also be made impure by being combined with mands, as when a very thirsty person reports seeing water where there is none. This applies as well to metaphorically extended tacts, and may indeed be among the fundamental bases for behavior that is considered to be hallucinatory or delusional. Just as metaphorical tacts may tell us about the contingencies governing the verbal behavior of the writer or speaker in a literary analysis, so may they similarly tell us about the contingencies governing verbal behavior of the client/patient in a clinical analysis.

For example, a young woman about nineteen years of age was admitted to a locked in-patient unit. In one of the common areas of the unit she was observed dancing in circles, twirling, giggling, and chanting "King of Hearts, Queen of Hearts, there's a cubba in the room!" She then began to laugh and dance more vigorously. When asked by a staff person, "What is a 'cubba'?", she replied that "A 'cubba' is a 'cubba' is a cubba!" She would then curtsy and shake her hands in front of her as a young child might when very excited. This apparently irrational behavior continued until procedures were instated which addressed the metaphorical content of her behavior. First it was discovered that one of the girl's friends had recently won a beauty contest. Now, what are winners of such contests, after all, but Beauty Queens. A little more investigation revealed that her girlfriend's boyfriend was nicknamed "Cubba." The staff began to note situations which occasioned the chanting and dancing. Invariably, these situations included the presence of certain young men who were also patients on the unit. The behavior now began to make sense. "King of Hearts, Queen of Hearts" apparently referred to the patient's friend, the beauty queen, and her boyfriend. The phrase, "There's a cubba in the room," tacted the presence of a young man to whom

she was attracted. This woman was, in effect, saying, "I want a relationship like my friend and her boyfriend have, and there's someone in the room to whom I'm attracted." Although disguised, probably as a result of what happens to people who talk too freely about intimate relationships (even those with "normal" social repertoires), the mand was clear.

The social worker assigned to this young woman's case reported that, during sessions with her family, the patient's father behaved toward her in a manner usually reserved for much younger children. The patient, in response, acted appropriately as though she were twelve rather than nineteen years old, e.g., sometimes sitting on her father's lap, bouncing on his knee, holding his hands, or giggling. When the social worker pointed out this pattern to the family, the mother replied, "Oh, they've been acting this way for years." The patient's giggling and childlike displays toward her father were patterns that, over the years, had been eminently successful at maintaining *his* attention. Unfortunately, the patient had been unable to maintain similar long-lasting relationships with men other than her father. She later reported having had several sexual encounters which, though initially satisfying, had ultimately left her abandoned and feeling increasingly alone. In fact, she had never had a "boyfriend" whose behavior toward her might have shaped or maintained more effective interpersonal repertoires. Not only did she lack the productive repertoires for such relationships, she also lacked the discriminative repertoires that would have allowed her to detect or describe what these other repertoires might be. So deprived ("starved of attention") that almost any attention by young men her own age became a highly potent reinforcer, the historically successful childlike patterns now reappeared and became exaggerated (see below). The young woman's otherwise rational behavior had indeed failed to pay off under the new requirements of her changing social milieu, and behavior which previously had been successful now occurred in its place. On the one hand, her intimate behavior was made highly probable by the potency of any attention it might receive from males her own age. On the other hand, that same behavior could only occur at great personal cost to her. Insofar as she displayed few of the skills necessary for a lasting relationship, aside from the childlike patterns, the woman's only alternative was to go without any attention at all. This is a good example of how multiple sources of contingency control can give rise to metaphorical extension, as noted earlier. Although her chanting, twirling, giggling, and references to "a cubba in the room" appeared to be "irrational" or "maladaptive" when viewed structurally (e.g., in terms of public or "private" antecedents in a spurious S-R relation), these patterns may be considered to be highly rational and adaptive when viewed in their functional context, given the alternatives available to the young woman (see Goldiamond, 1974, 1979, 1984, for earlier reports on similar cases).

By so describing her behavior as an impure metaphorical tact, with the mand component characteristically specifying its own reinforcer, a powerful consequence was identified which could be used in a program to help the patient. The problem became one of developing a program that could harness this consequence, but an initial dilemma for the staff was how or where to begin. If, on the one hand, attention were given to the behavior considered to be "inappropriate," the pattern would be maintained. If, on the other hand, it was ignored, the troublesome pattern would likely escalate to a point where the staff could no longer ignore it. Here, a lead was taken from Goldiamond (1974) who suggested that such a sequence of behavior could be viewed as a report card, with the A's praised, and the D's and F's ignored.

The inference that the young woman was tacting someone in the room with whom she might like to talk was used as a starting point (she got an A for stimulus control). Whenever her sequence of disturbing behaviors would begin, a staff person would approach her and say, "I

see that there is someone you would like to talk with here. Why don't we go back to my office and see if we can figure out a way to help you talk with him?" This and other variations were applied until, after about a week, standard tacts replaced the metaphorical ones, that is, the woman now began describing her situation in terms which were formally congruent with the prompts provided by staff persons.

Thereafter, the patient began to work on a program designed to teach her more socially acceptable ways to establish contacts and relationships with other people her own age. Without being directly targeted for elimination by the program, her disturbing patterns of behavior virtually disappeared as their behavioral "niches" were taken over by various former ("premorbid") patterns accompanying the shift from metaphorical to standard tacts. The staff also noted more pervasive changes in the woman's affect and general demeanor on the unit as her former patterns were reinstated. Isaacs, Thomas, and Goldiamond (1960) were the first to report such an instance of the reinstatement of a large verbal repertoire by reinforcement contingencies applied to only one component of that repertoire.

Although the verbal behavior of the first patient discussed above could be largely described as simple intraverbal operants[7] maintained by their success at involving the mental health system in her financial problems, the second patient's verbal behavior was much more complex. It involved not only intraverbal responses, but impure tacts, metaphorical extensions, and several autoclitics (e.g., hand-shaking, twirling, and chanting) that subtly altered the effects of what she was saying on the listener.

In terms of the treatment, however, the prognosis for the woman in the second case was much better. She had the education and outside support system that, if she acquired the necessary additional social repertoires, would support the new patterns. The first woman described above had acquired patterns that were successful at manipulating social institutions, reminiscent of the patients discussed by Braginsky et al. (1969). While the second patient required a program to establish relatively discrete interpersonal behaviors, the first patient required a program to change pervasive social systems patterns—requiring time and resources far beyond those available to the programers (but see Fairweather et al., 1969; Paul & Lentz, 1977, for descriptions of extensive programs addressed to the problems of chronic and repeatedly institutionalized populations). We were able to reduce the "severity" of the woman's "symptomatic" patterns by first analyzing the consequences maintaining them and then lessening the response requirements for their availability. However, asking such a patient to give up those patterns altogether may be asking too much. Accordingly, any attempts to do so, or suggestions at such attempts, will probably and quite rightly be resisted by the patient.[8]

[7] We considered her hitting the telephone-pole with a brick, the episode that first brought her into the hospital, to be a hidden mand for exactly that outcome. The woman's speech certainly appeared to have complex metaphorical components, but also typified the kind of imaginative "word salad" which chronic psychiatric patients often emit under almost exclusively intraverbal control. Accordingly, once she was admitted to hospital, we considered her continued talk about electricity and so on to be simply intraverbal. Although it could be correctly argued that her persistently talking this way both legitimized her "symptoms" and prolonged her stay, other patterns as well could have provided these outcomes. Moreover, her current utterances about "electricity" and "power surges," even if at one time metaphorically extended tacts, could no longer be considered metaphorical—she had a well-documented history of such complaints about electricity, and after their first occurrence, they simply ceased being metaphors (see Skinner, 1957, pp. 92–99).

[8] The failure of "nondelusional" behavior produced by various behavior modification procedures to transfer from specific treatment conditions to settings outside the clinic is probably better explained by taking into account these social-systemic contingencies than by reference to such spurious behavioral processes as "generalization." One has simply to ask what would happen to these patients if they stopped behaving in the particular ways which brought them institutional attention in the first place.

BOTH SIDES OF THE VERBAL COIN: SPEAKER/LISTENER TRANSACTIONS

If we consider the verbal behavior of the patient to be critical, then the verbal behavior of the programer (interviewer) is equally important. An interviewer's verbal responses at particular times can provide crucial discriminative events and may even potentiate a whole range of behavioral variables. These, in turn, may govern the course of the interview and subsequently influence the analysis and program design, as illustrated in the following case.

A 40 year old man was admitted to a locked psychiatric unit for behaving "irrationally" (e.g., trying to pull the clothesline poles out of the ground in his backyard), and speaking "irrationally" (e.g., shouting that the poles were blasphemous statues of the cross and that Jesus had told him to tear them down). During a constructional interview (after Goldiamond, 1974), the man began by saying how little influence he had on his family, that he had, in fact, no effect upon them, and that he had no hope until he began hearing the voice of Jesus. He spoke for an hour about what the voice had told him and that he felt compelled to follow it. Nothing could be done for him; he had no control over his life. When asked about what his family might think of his hospitalization, he said, "I guess I've disappointed them . . . . They've been upset for a long time." When asked what had upset his family, he looked up and said, "*I* did. *I'm* to blame. It's all *my* fault." The interviewer seized this opportunity and replied, "If indeed it *is* your fault, and *you* are to blame as you say, then you *do* have control, you *do* have an impact on your family, you *can* influence your own life. Maybe your family *is* ready to listen to you now." He looked surprised and asked, "Do you think so?" In the discussion that followed, he described his behavior as being ineffective at providing critical family consequences. From this, it was inferred that his "irrational" patterns were attempts to produce the involvement by his family he so valued. Steps moving successfully toward this outcome could be used as reinforcers to maintain his working on a program to establish such family involvement, and would provide a test of our original inference.[9]

If the Shoe Fits . . . : Clinical Insight as Instructional Control

At times the programer can look to his or her own reactions to a client for clues about what consequences may be maintaining that client's distressing patterns (see Ferster, 1972). For example, one "obsessional" patient wove a detailed and interesting story concerning her search for a dentist to solve the problems she had with her teeth. The story lasted for over three hours. Seeing how involved he himself had become in her story, the programer began to investigate how other people in the patient's life reacted to her heroic quest for a dentist. As it turned out, the woman was recently divorced after 25 years of marriage, and was now alone for the first time on a very important holiday. She developed an ill-defined periodontal pain, and called her ex-husband for assistance. He immediately came to her home and took her to a den-

[9] A program was designed to engage his wife in meetings with the programer and a social worker. Conversations during these meetings indicated that, indeed, all the man's attempts at involving his wife in his often demanding business problems had failed. Only when he became very morose did she comfort him and show concern for his situation. A programmatic sequence of contingencies, thereby, had been arranged, inadvertently reinforcing increasingly "pathological" patterns. During treatment, a similar program, but one targeting different behavior patterns, was implemented, including measures to reduce the response requirements imposed upon him by his business. Both the man and his wife were required to keep records, and both were trained to analyze these records in terms of consequential contingency relations. Concurrently, they were trained to develop procedures that could make available the consequences which, through their records, were identified as being critical to both of them. This strategy has been described in greater detail elsewhere by Goldiamond (1974, 1976), Layng, Merley, Cohen, Andronis, and Layng (1976), Merley and Layng (1976), Gambrill (1977), Cullen, Hattersley, and Tennant (1981), and Tennant, Cullen, and Hattersley (1981).

tist, who found nothing wrong with her teeth or gums. (Perhaps she merely found her verbal summator too hard to swallow.) Nonetheless, the problem developed to such an extent that relatives she hadn't seen in ten years now came to stay with her, and tried to help her with what they all thought was a medical problem. The program's outcome had become clear. Repertoires needed to be established that would maintain the close contact with others that her obsessive delusional pattern now made available (note, the mand here was assumed, but the actual content of the delusion was viewed as being governed mainly intraverbally; see footnote 9).

In the last two cases discussed above, intraverbal operants governed by their success at obtaining critical consequences appeared to account for the delusional and hallucinatory patterns. Although some metaphorical content was noted in the verbal behavior of the man who "heard Jesus," the programer decided that the best way to proceed was to treat it as an intraverbal. But what governs such decisions by the programer? Here, citing "clinical judgement" is merely a description of that which we seek to explain.

The distinctions between intraverbal, metaphorical, and other extended forms of verbal behavior become important for identifying such operants. In the case of a metaphor, the consequences important to a successful program may often be found in the referent. However, if the sequence is intraverbal and no nonverbal referent exists (i.e., the utterance is not a tact of a contingency), the search for the missing referent can be a waste of valuable time and effort. Distinguishing between these forms of verbal operants is not always easy. For example, when such verbal behavior occurs on a hospital unit, it may be followed conspicuously and reliably by the attention of the psychiatric staff.

Classifying the patient's behavior as simply intraverbal (governed by either public or private antecedents), as simply manding staff attention, or as serving both functions, overlooks the possibility that the verbal episode may actually be under multiple sources of control. Also, verbal behavior of this type quite often has multiple consequences, some being immediate (and conspicuous), others more remote (and hence obscure). In the case of the young woman cited above, giggling, dancing, and the apparently nonsensical verbal sequences she uttered did indeed produce staff attention. But it would have been a mistake to say that such attention was the sole controlling relation. The verbal sequence described was but one of many ways the woman might have produced attention. The question, "Why that *particular* sequence?" needs to be answered.

The following example further illustrates the difficulty involved in distinguishing between simple intraverbal patterns and metaphorical extensions. A middle-aged man was admitted to the hospital with an entering diagnosis of being paranoid. He said he was afraid he was being followed by the "Red Squad" of local police who were tracking down suspected communists. He related an elaborate story which included "hollow sounds" on his telephone (tapped, of course), secret codes between the agents following him (who made use of traffic signals and billboards in their communications), and so on (the usual stuff of paranoia). As in a literary analysis, the breadth and detail of the patient's story might suggest to the programer a search for nonverbal referents and specific allusions to governing contingencies. However, the man's references to persecution were not thematically congruent with his actual situation. The paranoid theme may well have been produced to some extent by an overall lack of control the man had over the affairs of his family and might thus have been considered to be an autoclitic. Nonetheless, the pattern was treated as being almost entirely intraverbal, i.e., selectively reinforced by its effects in gaining some control for the man over other members of his family. In fact, the affairs of his immediate family (brothers and sisters) became increasingly entangled with his own in proportion to each escalation of "symptoms."

Of course, the man had a history of engaging in other nondelusional patterns, but these had never had the prominent success of the current paranoid pattern (see Goldiamond & Dyrud, 1967, for a similar analysis of a different case).

A client's nonlexical or emotional behavior during an interview may provide additional instructional stimuli for the programer. Changes in tone, rapidity of speech, facial expressions, and posture are but a few so-called nonspoken cues ("body language").[10] However, caution must be exercised when looking at emotional accompaniments of verbal behavior. Occasionally, emotional behavior and certain autoclitics can indicate something about the prevailing or historical contingencies (i.e., those which established the pattern). As Goldiamond (1974) noted:

> We consider emotions neither as caused by behavior, in the James-Lange tradition, or as causing behavior, in the more classic tradition. We consider them as contingency related. Often they serve to indicate important contingencies .... Extinction, high cost, and punishment contingencies usually accompany reports of anger and fear, in accord with the laboratory literature on the emotional effects of such contingencies .... In all cases, affect is related to the contingencies and is used to teach the patient to uncover such contingencies .... A contingency analysis of emotions does not attempt to eliminate those emotions considered undesirable, disruptive, or distressful. It attempts to sensitize people to those emotions so they can be utilized to analyze and control the contingencies relevant to them and thereby to control these emotions. (p. 37; also see Goldiamond, 1975b, 1975c)

At other times, though, the accompaniments may in and of themselves be convenient operants maintained by their own particular effects on the social environment. Herein lies another pitfall for the programer. Namely, behavior that might once have been clearly a (by-)product of one set of contingencies may subsequently come under the control of different institutional/social contingencies, with any relation to the original referent lost in the transition (see, for example, Goldiamond & Dyrud, 1967). Thus, an emotionally charged verbal attack may originate as an adjunctive pattern (see Falk, 1971, 1977) or may result from changes in a controlling schedule of reinforcement (see Fredriksen & Peterson, 1977; Looney & Cohen, 1982). Thereafter, this emotional pattern may have its own effects on the environment and so be maintained by these effects in the absence of the originally inducing conditions. The pattern could no longer be considered a simple product of the inducing conditions, nor a simple reactive or affective pattern.

When an hallucinatory or delusional pattern is of recent origin, the chances are greater of finding a metaphorical extension that may aid the contingency analysis (but see the case of the woman whose "head fell off," above). For example, a woman was admitted to a locked psychiatric ward after acting strangely when told she was about to be discharged from a medical unit of the same hospital. At first, she answered almost every question put to her with "The Devil wants a pint of blood," but after an hourlong conversation with one of the authors, the woman replaced her cries about the Devil with a very emotional description of her homelife. This change occurred when the programer acknowledged that the Devil often does exact a great deal in payment, followed later in the conversation by, ". . . and often those who demand so much ara indistinguishable from the Devil." The woman responded by crying and putting her head in her hands, saying "That's true, that's so true." The programer then said, "You must be under a great deal of pressure, and have to meet many demands. It sounds very hard on you, so this hospital stay probably has given you a well-deserved rest, away from your husband and family, even though being sick is no fun." She then nodded and said, "My husband .... I do all I can, but he wants a pint of blood." Note that she now replaced talk about the Devil with references to her husband. From this point on, the conversation revolved around her relationship with her husband and family. Accordingly, the sub-

[10] This, of course, comes as no news to our psychiatrist friends. Such wordless forms of verbal behavior can provide clear S^D's, many classified as autoclitic mands (Mauldin, Karp, & Layng, 1979).

sequent intervention included a social worker skilled in handling family problems.

The fine-grain interview behaviors of the programer in the foregoing case were occasioned by specific instructional stimuli in the verbal report of the patient. First, the woman was about to be discharged from a medical unit when the episode began; since going home would have been inevitable upon her discharge from the hospital, the episode's occurrence at that time suggested that her home might be a place to be avoided. Second, the Devil is usually represented as a man. Finally, a pint of blood may be regarded as a sacrifice, the giving of which may weaken the donor, with extensive donations eventually leading to death. Taken together, these interpretations suggested that it was highly likely the woman was faced with a home situation where possibly excessive demands were placed on her, probably by her husband. From this and similar cases, a general guide has emerged that, while not always correct, may aid in deciding whether to proceed with the search for the referent of a putative metaphorical extension. We may summarize this briefly in the following set of *program pointers for the programer:*

1) Where there is a congruence between certain elements of the patient's life situation and those contingencies which appear to control a putative metaphorical extension, then there is a good chance that such a relation does indeed exist;

2) Further, such congruence may extend to relations involving nonspoken or emotional behavior, some of which may be autoclitics, or may themselves be discrete tacts of the contingencies; and

3) Congruence may be only thematic, with the formal verbal patterns varying widely as a function of audience or other consequential relations, perhaps giving the impression of *non sequitur* speech, "thought disorder," and so on.

THE LABORATORY AS CRUCIBLE OF CLINICAL JUDGEMENT

Our emphasis in this paper has been upon an initial functional analysis of hallucinatory and delusional patterns of behavior within the framework of a natural science of behavior. That these patterns are complex and often appear to be troublesome for a contingency analysis cannot be disputed. Nonetheless, we argue that both their complexity and their problematic aspects can be addressed adequately and perhaps best in the laboratory by an increasingly rigorous experimental analysis.

Clinical analyses governed by "associationist" or "stimulus-response" (S-R) models often result in causal status being attributed mainly to antecedent private events, themselves inferred from various indicator responses. Thus, where the maintaining consequences of occasion·behavior relations are ignored by the clinician, a most common approach is to consider the behavior to be reactive (see Burns et al., 1983). As we noted at the outset, a frequent assumption made at this point is that the behavior of the client is an accurate reflection of a distorted private world, since the responses of the client often appear incongruent with the public world. This almost inevitably leads to statements about neurological, biochemical, or cognitive abnormalities which either distort normal sensations or generate private stimuli *de novo.* The question remains, nonetheless, why responses indicating these so-called distorted perceptions consistently occur on particular occasions. Stated otherwise, the question is not whether the private events are present or absent, or whether or not private events can exert stimulus control over public behaviors; rather, what are the conditions (a) that *give rise* to these putative indicator responses and (b) that *maintain* them at a high probability on certain publicly specifiable occasions? Any account of these patterns must eventually provide answers to both questions. Laboratory studies have already suggested what answers are likely to be found.

Public Versus Private Events: Occasioning Stimuli

Goldiamond and Hawkins (1958), using training procedures that restricted observer response alternatives, were able to produce systematic verbal responses (tacts?) to blank presentations (i.e., the

absence of coherent visual stimuli) that essentially matched the results of previous experiments which actually employed coherent stimuli (e.g., previously learned nonsense syllables). The investigators attributed their results explicitly to the procedures they employed to alter response bias and clearly demonstrated that the obtained relation met the formal requirements of perceptual models which predicted a log-linear relation between prior learning and stimulus identification. However, in a subsequent critique of this experiment, the noted cognitive psychologist Ulrich Neisser (1967) argued that, "While we do not know whether their subjects did perceive any of the words . . . , we should not reject the possibility out of hand just because no words were actually shown. It is certainly possible that some of the Goldiamond-Hawkins subjects may have hallucinated some of the words, 'seen them with their own eyes' . . . ." (p. 120). Neisser, as well as others who call themselves behavioral psychologists, has sadly missed the important point of this experiment. Whether or not the subjects actually "saw" the missing stimuli is not the issue. Indeed, the subjects may have privately seen the nonsense syllables. Nonetheless, their indicator responses (tacts?), and possibly any accompanying private events, were still governed explicitly by the procedures used, and any changes in those responses could be related directly to changes in experimental procedures.

We are not arguing that the "privateness" of a stimulus excludes it in any way from an experimental analysis. Rather, the issue remains that the establishment and maintenance of discriminative control by private stimuli are still subject to consequential governance, given particular histories of reinforcement. In drug discrimination experiments, for example, a drug injection is arranged by the investigator and explicitly established as a private discriminative stimulus (see de la Garza & Johanson, 1983; Schuster, Fischman, & Johanson, 1981). The results of such experiments indicate that these private stimuli can enter into contingency relations in an identical manner to publicly observable stimuli. We submit that investigations of control by other classes of private stimuli should be governed by the same considerations and similar attention to consequential-contingency variables.

Public Versus Private Events: Maintaining Stimuli

As noted earlier in this paper, disturbing patterns of behavior are often referred to the clinic as a result of their cost to the patient, particularly when it appears to the community that there are no maintaining consequences for the patterns. When this occurs certain "internal events" are often suggested as maintaining consequences. For example, fear or anxiety reduction may be postulated as maintaining phobic responses. We have already given clinical examples which circumscribe the relevant issues here and have suggested a more parsimonious alternative: a detailed examination of what we call the "contingency matrix." Our formulation is based in large part on Goldiamond's nonlinear analysis of alternative sets of contingencies, founded in turn on basic experimental research in operant and psychophysical laboratories (the interested reader is referred to Goldiamond, 1975a, 1976).

One area of research that has been relatively neglected by applied investigators involves relations examined variously under the rubrics of "collateral," "adjunctive," or "schedule-induced" behaviors (see Falk, 1971, 1977; Lyon, 1982), "interim" behaviors (see Staddon, 1977), and multiple-response repertoires (see Dunham & Grantmyre, 1982). What all have in common is that targeted changes in one set of behavioral relations result in changes in other sets of behavioral relations not directly manipulated by the investigators. Of special note in this regard is the work of Dunham and Grantmyre (1982), which identified sequential dependencies among patterns of behavior; changing the frequency of occurrence of one such pattern (either by punishment or by response restriction) systematically changed the probability of other

patterns as well, without directly altering the consequences of the latter patterns. Evidence of such interdependent relations between contingencies supports the formulation by Goldiamond (1979, 1984) of systemic treatment procedures in clinical applications.

We suggest such relations and their interdependencies involve as well what Goldiamond has called "potentiating variables" (Goldiamond & Dyrud, 1967; Goldiamond & Thompson, 1968), or what Michael (1982) has since called "establishing operations." Particular arrangements within one contingency matrix can affect the potency of another contingency matrix or any of its elements—a targeted change in the first matrix may result in systematic change in the other one, even without direct intervention into the second. Although we have observed possible instances of such potentiating relations between contingency matrices in the clinical setting, final resolution of the various kinds of matrix interdependencies awaits more systematic and thorough laboratory investigation.

The Role of Individual History in a Functional Analysis

When behavior occurs as if "out of nowhere," i.e., with no apparent antecedent event or immediate prior history to account for its current occurrence, internal mechanisms are often posited in place of a more rigorous analysis. Such mechanisms, usually stated in terms of regression, manifest pathology, symptomatology, thought disorders, and so on, are invoked as accounts of how current behavior is related to the individual's past history, ontogenetic or genetic. Again, basic research suggests an agenda for future clinical studies. Included in this agenda are analyses of relations between historical and current contingencies, and of multiple sources of control.

For example, Stoddard and Sidman (1971) established a circle vs. ellipse discrimination with macaque monkeys. The discrimination was subsequently made impossible, rendering previously successful patterns of responding unsuccessful, i.e., the patterns could no longer result in previous high rates of reinforcement. Nonetheless, the behavior of the subjects did not become merely random. Instead, stimulus-response topographies or position preferences reappeared that were accidentally reinforced during the training sequence but subsequently extinguished. Similarly, Epstein (1983), using pigeons as subjects, showed that during extinction of a recently reinforced pattern of behavior, previously established patterns, themselves having undergone extinction at an earlier time, will now recur (also, see Epstein & Skinner, 1980). This relation has been characterized in a formal "principle of resurgence" (Epstein, 1983) and suggests an important source of systematic behavioral variability which may be differentially selected by new reinforcement contingencies.

Selection of particular behavioral variants by novel contingencies, in turn, has been characterized formally as "contingency-adduction" when a single historical class of behavior is involved, and as "contingency-coadduction," when a novel combination of several historical classes of behavior is recruited by the prevailing contingencies (Andronis, 1983; Andronis, Goldiamond, & Layng, 1983; Andronis & Goldiamond, 1983). The obvious clinical relevance of resurgence, contingency-adduction, and contingency-coadduction, especially as these relate to such theoretical issues as "diathesis/stress" hypotheses and "symptom choice," will be discussed at length in a paper that examines the origins of clinically relevant behavior, later in this series.

Animal Simulations of "Psychopathology"

Many investigators have reported what appears to be intrinsically costly animal behavior in the laboratory that resembles human behavior in the hospital or clinic (see for example Green, 1983; Pavlov, 1903; Watson, 1924; and collections edited by Cullen, 1974; Keehn, 1979; Kim-

mel, 1971; Zubin & Hunt, 1967). Most of these investigators tend to treat such patterns as a breakdown of the animal's normal functioning. In contrast to this approach, however, recent experiments by Layng, Andronis, and Goldiamond (1983) have demonstrated that typical consequential procedures will maintain headbanging by pigeons. The approach suggested here was anticipated by Sidman's (1961) experimental analysis of some "normal sources of pathological behavior." Experimenter control over such patterns in the laboratory allows extensive and perspicuous examination of how these patterns may be governed in clinical settings. Clinically, they are often considered evidence for allegedly abnormal or maladaptive functional relations (although we feel terms such as these to be oxymoronic and, hence, meaningless in a science of behavior).

CONCLUSION

Throughout this paper, we have stressed the importance, indeed the primacy, of a scientific analysis of behavior for any technology directed toward intervention in clinical problems as described in this paper. We agree with the objectives for a science of behavior, and its consequences for clinical applications, first articulated by John B. Watson sixty years ago. Watson (1924) wrote:

> I am pleading for simplicity and ruggedness in the building stones of our science of behavior. I am trying to show . . . *that you can by conditioning not only build up the behavior complications, patterns, and conflicts in diseased personalities, but also by the same process lay the foundations for the onset of actual organic changes which result finally in infections and lesions*—all without introducing the concept of the mind body relation . . . or even without leaving the realm of natural science. In other words, as behaviorists, even in "mental diseases" we deal with the same material and the same laws that the neurologists and physiologists deal with. (page 300, emphasis in original)

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